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ABSTRACT

An intervention program employing test-skills instruction and cooperative learning methods was presented to second year minority medical students at a major state supported medical school. The purpose was to enhance minority students' passing rate for Part I of the National Board of Medical Examiners (NBME) examination. After completion of the program, it was observed that the passing rate of the minority students during that year significantly surpassed that of the minority students from the previous year, and approached the passing rate of the nonminority students in the class. The mean National Board Examination score for the students participating in the program was not statistically different from that observed for an equal number of randomly selected second year nonminority students. The major questions addressed by the study were affirmatively answered. Results indicated the applied intervention procedure can reduce disparities between minority and nonminority students on both scores and passing rates for the NBME. Results suggested that effective test-taking instructions with participation in small learning support groups can enhance performance for all students. Effective academic support programs can, and should be, established for advanced level students. The program described here requires students to be active, rather than passive, participants. (Author/DWH)

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Evaluation of an Intervention Program's Impact on Minority Students' Standardized Test Performance

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Abstract

An intervention program employing test-skills instruction and cooperative learning methods was presented to second year minority medical students at a major state supported medical school. The purpose was to enhance minority students' passing rate for Part I of the National Board of Medical Examiners examination. Nineteen of the 21 second year minority students voluntarily participated in the program. After the program had been conducted, it was observed that the passing rate of the minority students during that year significantly surpassed that of the minority students from the previous year and approached the passing rate of the nonminority students in the class. Moreover, the mean National Board Examination score for the students participating in the program was not statistically different from that observed for an equal number of randomly selected second year nonminority students. The results of the program were encouraging, and further examination of the effects of student development and support intervention efforts on minority and other medical students' performances are suggested.

Evaluation of an Intervention Program's Impact on Minority Medical Students' Standardized Test Performance

National Board Examinations (NBE) are used at many U.S. medical schools for such purposes as: academic promotions, a requirement for graduation, and comparing students to national norms (1). For a number of medical students, the NBE, especially Part I, represents a major hurdle, and for some it is an especially formidable barrier. The latter, however, seems particularly true for minority students. The anticipated failure rate for all students taking the NBE Part I for licensure is 10-13% (2). But the failure rate for minority students taking the exam for the first time could well surpass the 10-13% range. A study by Rolph, Williams, and Laniear (3) pointed out the NBE performance discrepancy between minority and nonminority students. They reported the mean NBE Part I score for minority students attending ten selected predominantly white medical schools was 76 points below that of nonminority students: a significant difference between the two groups. Moreover, Rolph et al found that even when minority and nonminority students have equivalent preadmission characteristics, the predicted Part I scores of minority students were at least 22 points lower and at least 36 points lower on Part II.

The problems many minority students face regarding Part I of the NBE have concerned administrators at many medical schools. But unfortunately, there have been few documented successful attempts in addressing those problems. Further, some of the difficulties associated with students' poor performance on tests may be related more to inadequate test-taking skills rather than a lack of knowledge (4-7). Inadequate test-taking skills, particularly when applied to multiple-choice exams like the NBE may lead to: misinterpreting item statements;

misreading item statements or options; inappropriate pacing, i.e., progressing too fast through the exam or spending inordinate amounts of time on single items; lacking confidence in knowledge levels regardless of preparation; fatigue, both mental and physical; being intimidated or threatened by tests; lack or loss of concentration; and a general lack of sound test-taking behavior. Each of those factors can separately lead to repressed test scores and for some students those problems occur in multiples. On standardized and other critically important exams, such problems can be particularly acute and pervasive. But for minority students in particular, those problems are also often more pernicious. Moreover, problems faced by minority students are often chronically affected and compounded by educational and other experiences that may inhibit the development of skills that facilitate successful performance particularly on norm-referenced standardized multiple-choice tests (8).

To address performance problems several approaches could be employed. One common approach is for students to enroll in commercial courses (9), although the costs of such courses may be prohibitive for some students. A second approach focuses on the teaching of effective test-taking skills (10). A third approach encourages students to establish cooperative learning or learning support groups to reinforce, develop and expand levels of knowledge (11-14). A fourth approach combines test-taking skillls instruction with learning support group participation. The fourth approach was applied in this study.

The combined test-taking skills and learning support group approach was applied at a major state supported medical school as a special program focusing on minority students. The school had expressed concern over the comparatively low performance of enrolled minority students on previous NBE Part I exams. The program was conducted through the school's Office of Minority Affairs, and the major program objective was to provide intervention to enhance minority students' (hereupon, the target group) overall performance on NBE Part I.

The purpose of the study was to evaluate the program's impact on the NBE performance of minority medical students. Three questions were addressed regarding the program:

1) Can the effects associated with intervention reduce disparities between minority participants' and nonminority nonparticipants' NBE Part I performances?

2) Can the effects associated with intervention reduce disparities between minority and nonminority students' passing rates on the NBE Part I?

3) Can the effects associated with intervention produce a higher passing rate for minority students when compared to the performance of minority students in the previous year?

METHOD

Design

To determine if there are effects associated with the interventive treatment, three comparisons using the NBE Part I performance were made: (1) comparing the participants' mean scores with a random sample of second-year non-target (nonminority) group students; (2) comparing the participants' success (passing versus failing) rate with that of the random sample of nonminority students; and (3) comparing the participants' success rate with minority students' performance from the previous year. Those three comparisons comprise the basis for answering the three questions the study addresses.

In addition, to examine the program's overall impact on the performance of all second-year minority students, two other comparisons were made. The 21 target group students' NBE Part I success rate was compared with the 25 second year minority students from the previous year. Also, the target groups's NBE Part I success rate was compared with the 104 second-year nonminority counterpart students. Those two comparisons were primarily for evaluative purposes and to gain a picture of the program's blanket effect associated with the performance of

all minority students during that year.

Sample Program Participants

The target group consisted of 21 minority (15 men and 6 women: 12 Hispanics, 6 Blacks, 1 Native American, and 2 Asian Americans) second-year medical students who were scheduled to take the NBE Part I for the first time during the month of June. Of the target group, 19 (14 men and 5 women: 11 Hispanics, 5 Blacks, 1 Native American, and 2 Asian Americans) students chose to participate in the program. Those students' NBE performance was compared with that of a randomly selected sample of 19 nonminority (14 men and 5 women) second-year students who did not participate in the program (Some nonminority students participated since the program was not all exclusionary). For additional evaluation purposes, data from all 21 students were examined, as well as data from the 25 second-year minority students (19 men and 6 women: 17 Hispanics, 3 Blacks, 2 Native Americans, and 3 Asian Americans) from the previous class.

Program Procedures

The intervention program consisted of two primary components: (1) teaching an effective approach to taking multiple-choice exams, specifically the NBE; and (2) introducing the use of learning support groups. The overall objective for teaching effective test-taking was to provide the students with an approach they could employ in facilitating their ability to more accurately demonstrate acquired knowledge and to reduce the likelihood of high levels of debilitating test anxiety.

The 19 participating students met for formal program activities on three separate days for a total of 15 hours. Nine hours of instruction were devoted to teaching and reinforcing effective test-taking approaches and six hours to building and maintaining learning support groups. The three sessions were presented in two components. The first component consisted of one and a half days

(nine hours). The full day (six hours) involved test-taking skills instruction. The following half day (three hours) consisted of establishing learning support groups. The second component consisting of a full day, two months following the initial sessions, attempted to reinforce both effective test-taking methods and the use of the learning support groups.

The topics emphasized during test-taking instruction were: testing and measurement principles related to standardized exams; conversion of raw scores to standard scores and its implications for norm-referenced exams; the structure and construction of the various item types found on the NBE Part I; the application of effective techniques for each item type; a systematic approach for completing lengthy exams; demonstrating the importance of accuracy and concentration in test-taking; the role of attitude in affecting test performance; the use of guessing strategies; and the importance of practice in acquiring effective test-taking skills.

Participants worked through a series of practice exam items to try out and reinforce suggested test-taking techniques. Correct answers were always given immediately after each practice test. The exception was the first practice test where each item was attempted simultaneously and in sequence by all participants on a group basis. Correct answers were then provided immediately after each item was attempted and a response selected by the participants.

The purpose of the above procedure--combining instruction and practice--was to introduce the participants to effective test-taking modes and then allow them to practice the suggested procedures. While the didactic instructions related to effective test-taking involve primarily cognitive encoding of information, the practice mode allows participants to begin incorporating the actual process in their test-taking behavior.

The establishment and use of cooperative learning groups was an important feature of the intervention program. The intent of the learning support group

activities was to encourage participants to form small groups that provided socio-emotional support and served as vehicles for enhancing learning, facilitating content review, reinforcing acquired test-taking skills, and expediting preparation for the NBE Part I. Participants were shown the benefits of sharing knowledge within peer groups and ways to facilitate the process by using practice or self-assessment tests. (The use of practice tests also acts to reinforce test-taking skills as well as to assist in identifying weak areas of content knowledge.) The participants agreed to form small self-selected groups (5-7 in number) that would remain intact up to the administration of the NBE.

After the groups were formed, an exercise was used that called for the participants to employ consensus methods in selecting group answers on practice tests. The importance of carefully listening to group members who demonstrated knowledge in various content areas was also emphasized. The exercise involved the participants in taking a practice test individually and then assembling into their groups to answer each test item by consensus or unanimous agreement. Both individual and group scores were recorded. The objective was to demonstrate that group scores higher than the highest individual score could be consistently achieved through discussing each item and willingly sharing related information and also, whenever appropriate, discussing the use of various test-taking techniques. Consequently, almost every group member could gain additional knowledge under cooperative student-student interactions. Thus, the recognition and use of peers as significant learning resources was also a major goal of this segment. Discussion of the use of groups in learning and test preparation, the formation of groups, and accompanying group exercises covered six hours.

In summary, instructional contact with the participants covered three intermittent sessions over two and a half days. The first two sessions consisted of six hours of effective test-taking instructions and three hours of building learning support groups. A follow-up session consisting of three hours focusing

on the preformed support groups occurred after a two-month interim.

A final session was conducted by a member of the Office of Minority Affairs, who followed prearranged instructions. This session consisted of the administration of a lengthy (218 items) timed simulated NBE Part I subtest just prior to the official administration of the NBE. Correct answers were provided after the participants completed the test in the prescribed time limit (two and a half hours -- approximately 40 seconds per question). One objective of the final session was to provide the students with a final practice session under significant time pressure using a long subtest with items similar to those students encounter in the NBE. Other objectives were: to allow final sharpening of test-taking skills; to reinforce student confidence in both their levels of knowledge and test-taking skills; and to insure that the students realize they can complete the NBE within the required time limits.

RESULTS

First, to ascertain if the effects associated with intervention could reduce disparaties between minority students and nonminority students, the 19 target group participants were compared with 19 randomly selected nonminority or non-target group students from the second-year class. The mean NBE Part I scores for the target group participants and non-target group sample are shown in Table 1. The t-test showed the difference between the means to be insignificant.

Table I

t-Test Comparing Target Group Participants and a Non-Target Group Sample on National Board Part I Performance

Group	N	Mn	SD	t
Participants	19	451.842	75.521	1.547 (NS)
Non-Target Sample	19	490.579	78.795	

Second, in comparing the participants' passing rate with that of the randomly

selected group of nonminority students, the overall passing rate is simply defined as the percentage of students who passed (recorded a total score of 380 or better) Part I on the initial attempt. The passing rates of the target group and non-target group were 79 percent and 89 percent, respectively. In comparing the overall passing rates of the participants and nonminority students, the Test for Significance of Difference Between Two Proportions was applied. As shown in Table 2, the participants' NBE passing rate did not statistically differ from the nonminority sample.

Table 2

Comparing National Boards Part I Passing Rates

Between Participants and Nonminority Students

Group	N	Proportion of Success	z
Participants	19	.79	0.839 (NS)
Non-Target Sample	19	.89	

Third, to find if the participants' passing rate on Part I differed significantly from that of minority students in the previous year's class, the Test for Significance of Difference Between Two Proportions was again employed. The passing rate for the 25 minority students from the previous year was 52 percent compared with the participants' 79 percent. As displayed in Table 3, the two success rates differed significantly. In comparing the two groups of minority students, the group receiving intervention had a significantly higher proportion of passing scores.

Table 3

Comparing National Boards Part I Passing Rates

Between Participants and Minority Students From the Previous Year

Group	N	Proportion of Success	z
Participants	19	.79	1.858*
Previous Year Minority Students	25	.52	

*$p < .05$

To determine if, during the year the program was conducted, the success rate of all second-year minority students differed significantly from that of the minority students in the previous year, all 21 students were included and compared with the previous year's 25. The Part I success rate of the 21 students was 81 percent versus the 52 percent for those in the previous year. Employing the Test for Significance of Difference Between Two Proportions, unsurprisingly the difference between the two passing rates was significant ($z = 2.073$, $p < .05$).

Finally, to further examine the program's overall impact on minority students' levels of success on Part I, the 21 students' passing rate was compared to that of the 104 nonminority students in the class. The passing rates of 92 percent and 81 percent for the nonminority and minority students respectively, did not differ significantly ($z = 1.556$, $p > .05$).

DISCUSSION

The major questions addressed by the study were affirmatively answered. The results indicated that the intervention procedure applied can reduce the disparities between minority and nonminority students on both scores and passing rates for the NBE. The results also showed that the intervention approach was associated with significantly higher passing rates for minority medical students receiving the intervention as compared to minority students in the previous class

who had not received the same interventive treatment. The overall impact of intervention was substantial in both increasing the passing rate for minority students over the previous year and reducing the passing rate gap between minority and nonminority students.

The findings and related procedures have promising implications. The results suggest that effective test-taking instructions with participation in small learning support groups can enhance performance for minority medical students and, more likely, all students in general. But, since minority students generally perform at lower levels than nonminorities on standardized tests, both in terms of mean scores and success rates, any interventive methods which help to improve performance demand attention.

The findings also suggest that effective academic support programs can and should be established for medical and other advanced level students. This study points out the possibility of developing programs that can substantively enhance the performance of medical students. Further, a program such as the one described, requires students to be active instead of passive participants, and the approach also calls for an atmosphere that is more self-directing, particularly with its emphasis on self assessment. Consequently, students were encouraged to determine their strengths and weaknesses regarding content knowledge as well as establishing effective test-taking procedures.

With evidence indicating that effective intervention programs can be mounted for medical school students, more effort should be undertaken in addressing academic performance problems found in students at the graduate professional school level. The development and expansion of academic support programs at rigorously demanding academic environments would provide a substantial service to a number of students. Assisting students in becoming more effective learners and also in applying what they have learned (as measured by evaluative tests) may often be the difference between academic success or failure. Parenthetically,

academic success should be a major concern if the aim of education is indeed to help students develop competencies within conducive environments. Conducive educational environments should, of course, provide recognizable support for students. Within a conducive educational environment students, for example, should not be penalized for lacking appropriate test-taking knowledge or skills that inhibit accurate demonstrations of knowledge on multiple-choice or other exams when corrective methods are available. Sound instructions in effective test-taking can address those problems. Cooperative learning groups, on the other hand, can address problems related to both learning and successfully coping with demanding environments. Consequently, more positive perceptions of the academic environment can occur when students establish their own collegial support systems.

Although the results were quite encouraging, replications under experimental conditions would be illuminative. For example, attempts to examine the discrete effects of test-taking skills instruction and cooperative learning procedures on performance might provide useful information on the separate effects of both approaches. Also, in other studies the use of randomly selected treatment and control groups (since a randomly selected treatment group was not possible in this study because of the nature of the project) would provide further validity if similar results are found. Another approach would be an examination of the effects of analogous interventive procedures on nonminority students as well. The supposition is that similar results will be found. Any additional research and development regarding other interventive modes that may facilitate learning and performance are strongly encouraged.

The primary problem, i.e. enhancing performance, addressed in this study is of profound importance in the area of student development. The means to develop and establish effective measures for some of the problems related to learning and performance for students in advanced professional education programs are apparently available. The critical question, however, is will appropriate

opportunities be provided that facilitate students' academic success?

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